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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20031216

Application Number: 09/738,591
Filing Date: December 15, 2000
Appellant(s): OTTER, JIM

Karin H. Butchko

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 14, 2003

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1-5,7,2-23,25,26,28 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8) in the text of arguments.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

4,848,314	BENTLEY	7-1989
4,421,789	KANEKO et al	12-1983

3,973,510	MCCULLOCH et al	8-1976
6,132,801	LINFORD	10-2000
6,013,372	HAYAKAWA et al	1-2000

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-4,20,22,23,26,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789.

Bentley teaches a heat exchanger part formed by laminating a corrosion-resistant, stable thermoplastic polymer sheet material to a metal surface (carbon steel, aluminum, etc), col. 3, 43-col. 4, 43. In service, the resultant part permits flow of condensed water which is removed from the unit in the presence of a corrosive flue gas. Use of polar particulates on the sheet material is not cited.

Kaneko et al teaches forming similar heat exchanger parts comprising a metal substrate onto which is applied a thermoplastic, corrosion-resistant polymer coating film, and then applying thereto polar silica particles, in any convenient manner, to increase wettability of the surface and hence process efficiency (col. 1, 30-50; col. 2, 52-63; col. 3, 3-37). Application may be by

powders, an aqueous suspension, sol solution, etc. As noted in Example 8, resin-coated panels were squeezed and dried, followed by application of the silica in sol form (a sol being a liquid dispersion of very fine-sized particulates), followed by roller squeezing and heating (necessarily including cooling to provide utility to the article), according to claims 3-4.

Both references are directed to forming heat-exchanger parts having surfaces which are corrosion resistant by virtue of a thermoplastic polymeric surface layer (per claim 2) and demonstrate wettability to allow condensate flow. While Bentley et al does not teach application of polar particles, Kaneko et al explicitly teaches to apply such particles for improved wetting, such that one of ordinary skill would have been motivated to apply such polar particles, e.g. silica, to the thermoplastic sheet material of Bentley et al to provide the advantage of improved wetting and process efficiency.

As to claims 20 & 22, Kaneko et al expressly discloses polar silica particles and olefin type resin films (col. 2, line 61), encompassing conventional polyolefins. Kaneko also teaches use of a roller assembly for incorporating particles per claims 23 & 28. Surface tension/ energy of the film comprising the polar silica particulates must necessarily be increased in both the Applicants invention and combination of references of the rejection to increase flow/ wettability of condensed water as taught by Kaneko et al (col. 3, 23-53) per claim 26.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Bentley et al by incorporating polar (silica) particles onto the corrosion-resistant thermoplastic as taught by Kaneko et al to improve wettability and overall process efficiency.

2. Claims 5,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789 and further in view of McCulloch et al US 3973510.

Bentley et al and Kaneko et al are cited for the same reasons discussed above, which are incorporated herein. Applying polar particulates by pressing them into an adhesive applied to the surface is not cited.

McCulloch et al is introduced because it discloses the concept of applying silica particles to a binder coated surface to provide thereon a distribution of particles which lowers the coefficient of friction between water and surfaces, in this case, a seagoing vessel. The particles are blown into the tacky adhesive or polymeric binder coating (including thermoplastics, col. 4, 31-36), followed by curing (col.2, 15-22). The blowing of the particles into the tacky coating necessarily presses the particles into the adhesive or polymer to cause adhesion. Although not directed to a heat transfer/ exchange component, since both involve the unimpeded flow of water along contacting surfaces, it is the Examiner's position that one of ordinary skill would have looked to analogous particle coating arts which solve the same problems to find ways to attach particles to the heat transfer/ exchange component of Bentley et al in view of Kaneko et al.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Bentley et al in view of Kaneko et al by applying the particles to a tacky adhesive layer and curing as taught by McCulloch et al in order to form a polymer-coated surface with polar silica particles therein.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789 and further in view of Linford US 6132801.

Bentley et al and Kaneko et al are cited for the same reasons discussed above, which are incorporated herein. Coating an outer surface of the polar silica particulates is not cited.

Linford teaches on col.1, 33-54 and col. 5, 1-8 that the application of a polymeric coating on silica and other inorganic particles allows a more robust coating attachment in micro particle/ polymer composite materials to prevent de-bonding of the particles. Since Bentley et al in view of Kaneko et al teaches silica particles, including powders, adhered to a polymeric base, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Bentley et al in view of Kaneko et al by coating such silica particles as taught by Linford to provide the benefits of a stronger attachment of the particles to the base, thereby reducing de-bonding of the crucial silica particles and resulting in a longer useful lifetime of the parts.

4. Claims 21,25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789 and further in view of Hayakawa et al US 6013372.

Bentley and Kaneko are cited for the same reasons discussed above, which are incorporated herein. Use of other polar particulates, which may be germicidal, are not taught. Hayakawa et al teaches that titanium dioxide may be applied alone, or with silica, to fins of a heat exchanger to enhance efficiency and preventing surfaces from being clogged by condensate (col. 8, 13-18). Titanium dioxide is inherently a germicide, and is the same germicide material taught by Applicants on page 5, 15-17.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Bentley in view of Kaneko et al by substituting or adding titanium

dioxide particles to the surface of heat exchanger parts as disclosed by Hayakawa because titania is taught to provide the same benefit as silica of enhancing flow of condensate off heat exchange surfaces and providing germicidal effects to prevent bacterial build-up.

5. Claim 27 in independent form distinguishes over the prior art which does not teach nor suggest an outer coating of maleic anhydride on polar particulates for application to a heat transfer surface.

(11) Response to Arguments

1. Claims 1-4,20,22,23,26,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789. The references are cited for the reasons previously stated, and as discussed below in response to remarks. Applicants' comments have been carefully considered.

Bentley teaches laminating a corrosion-resistant polymer sheet to a metal heat exchanger part to permit flow and removal of condensed water. Polar particulates on the sheet is not taught. Kaneko et al teaches to apply a corrosion-resistant polymer layer to similar heat exchanger parts, and then adding polar particulates to increase wettability and increase efficiency of flow and removal of condensed water. After application of the particulates, the surface may be roller squeezed and heated to cause adhesion of particles.

Applicants argue the order of steps of the instant Application versus the cited prior art. The Examiner recognizes that Applicants' claim 1 applies and adheres the particulates to the film sheet prior to laminating the film sheet to the heat exchanger part. The combination of references

applies the same particulates to the film sheet after it has been laminated onto the heat exchanger part. The mechanism of enhanced flow is due to the presence of the particulates on the corrosion-resistant polymer film surfaces, and NOT the order of applying particulates and lamination. There is simply no rationale or evidence provided by Applicants to define a patentable difference in the outcome of the process regardless of whether the particulates are applied onto a film which is subsequently laminated to the part, or the part is laminated with the film and then the particulates are added, it being the Examiner's position that such a difference is within the purview of one of ordinary skill because the skilled artisan would have expected equivalent results. Applicants have failed to establish a clear and convincing showing of synergistic or unexpected results to the contrary for their order of steps.

It is well-established that there is no invention in combining various known elements/ features of the prior art in such a manner that they perform in combination the same function set forth by the prior art without providing a non-obvious and unexpected result, In re Lindberg 93 USPQ 23 (pp. 26-27) and In re Rose 105 USPQ 237 (p.241 +). In the instant application, the features of Applicants' method are neither new (the general steps being disclosed by the prior art, albeit in different sequence), unobvious, nor produce an unexpected result. The combination of references would have produced the equivalent results as the method of Applicants' claim 1, namely to improve water flow on surfaces of heat-exchange components and improve process efficiency, and accordingly Applicants' claims are unpatentable.

Applicants further argue it would not be possible to add silica particles to the film before application to heat-exchange components "because the film must be applied to the panel as a solution". Applicants appear to have selectively cited examples 1-3. The Examiner points out the

FULL process description on column 3, 2-22 and example 8 which teaches applying a thermoplastic resin layer prior to adding silica particles which then MUST adhere to the corrosion-resistant resin layer. Since the resin layer would be analogous to the thermoplastic resin sheet material which is subsequently applied to component surfaces, it is the Examiner's position that application of the particles to the film, followed by addition of the particle-containing film to the component surfaces would have been obvious. Applicants simply never state why this would not be possible, nor why the process claimed must be carried out in the cited order of steps and any unexpected results

2. Claims 5 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789 and further in view of McCulloch et al US 3973510.

The references are cited for the reasons discussed above.

Applicants argue there is no suggestion to employ an adhesive binder layer to adhere silica particles to the polymer film because the silica is adhered by removal of moisture which causes adherence. The Examiner agrees this is one embodiment but points out that (1) Kaneko repeatedly stresses adherence and durability of the silica to the film (see, for example, col. 3, lines 20,28,30 & 66, col. 4, line 5; etc), and (2) Kaneko also teaches the use of powders on col. 3, line 18. McCullough teaches to apply a tacky binding agent to a surface, followed by applying silica powder to adhere the silica to the surface. Keeping in mind that Kaneko requires adherence of silica to the polymer surfaces on heat exchange components, the use of a tacky binder to adhere the silica powder of Kaneko would have been obvious to affix the silica powder.

To take Applicants arguments at face value, applying silica powder without an adhesive binder would not cause the silica particles to be fixed/ adherent, thereby destroying the intent and spirit of Kaneko and hence the combination of references. Thus, the use of a binder would have been an obvious means to adhere the silica particles to surfaces of the component.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al in view of Kaneko and further in view of Lindford US 6,132,801.

The Bentley and Kaneko references are cited for the reasons discussed above.

Applicants argue "there is no benefit to coating the silica particles of Kaneko" because the active silanol groups of the silica particles on column 3, 23-37 would be coated and therefore inoperable. That may be so for this specific embodiment. However, Kaneko explicitly teaches the cites fine silica may be applied "in any convenient manner" including powder form. Since Kaneko repeatedly requires adherence of the silica to the resin, a binder on the particle would have been obvious to promote the particle adherence required by the reference. Further, if polar particulates are required for the component surfaces of particle-coated heat exchanger surfaces, then the coating of the polar particles of Applicants' claim 7 would equally cover the active polar surfaces of Applicants' claims, preventing its function as a polar surface. Thus, Applicants' arguments are not convincing.

4. Claims 21,25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley et al US 4848314 in view of Kaneko et al US 4421789 and further in view of Hayakawa et al US 6013372.

Bentley and Kaneko are cited for the same reasons discussed in the previous Office Action and as above.

Applicants argue there is no suggestion to substitute silica for titania in Kaneko, and that the titania of Hayakawa would not contain the silanol groups of silica.

The Examiner points out that Hayakawa teaches to use titania (synonym for titanium dioxide) for the identical purpose as silica, namely to form hydrophilic surfaces to enhance water flow and efficiency in heat-exchanger elements (see column 8, 13-18). Furthermore, titania is a polar particulate (see figure 2A), and is a member of the Markush Group of Applicants' claims 20-21. The obvious point that titanium oxide does not contain silica groups does not negate the fact that the prior art recognizes titania performs the same function for the same application, and therefore it would have been obvious to substitute polar titania particles in place of polar silica particles because of the expectation of enhancing water flow and efficiency in heat-exchanger elements by the same or similar mechanism.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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December 29, 2003

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